An Economic Analysis of Voting in Sweden*

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Abstract

This paper presents a theoretical model of rational retrospective voting, which is tested empirically on pooled cross-sectional and panel data from the Swedish Election Studies between 1985 and 1994 supplemented with time series on inflation and unemployment. Compared with the cross-sectional estimates, the panel estimates indicate a relatively greater impact of macroeconomic variables on the individual vote. The principal finding is, however, that microeconomic variables influence the vote about as much as macroeconomic variables do. In consequence, self-interest appears to be an important part of an adequate understanding of economic voting in Sweden. Regarding the determination of election outcomes, macroeconomic variables have been more influential.

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1. Introduction

To what extent does self-interest explain vote choice? This much debated question has led researchers to examine the relative impact of macro- and microeconomic variables on the vote. If voters are primarily driven by self-interest and therefore support governments that advance their individual economic interests, microeconomic variables are expected to influence the vote. If voters are concerned with some conception of the public interest, one expects macroeconomic variables to influence the vote. However, since a prosperous economy is beneficial to everyone regardless of the concern for fellow citizens, responses to macroeconomic variables do not rule out self-interest. Consequently, it is only possible to test whether voters are altruists. If responses to microeconomic variables are considerable, this hypothesis can be rejected.[1]

This paper develops a simple theoretical model of economic voting and tests it on Swedish data. The model formalizes the discussion on economic voting by capturing implicit assumptions in the empirical literature. In particular, the model shows how individuals can use economic variables to infer how much they have to gain from the reelection of the incumbent government; in other words that retrospective voting is rational.[2]

The model contains two motivations of retrospective voting.[3] The first motivation originates from Downs (1957), who argues that policies of political parties are stable over time. Because of this, retrospective voting helps to predict the policies that candidates from the incumbent government would implement if they

[1] Since a wide definition of self-interest makes this interpretation of economic voting very difficult to refute, it has been argued that only responses to microeconomic variables should be interpreted as signs of self-interest. See Lewin (1991) for an elaboration of this view.

[2] With retrospective voting I mean voting based on results as opposed to prospective voting, which is based on intentions. Fiorina (1981, p. 8) notes that "The traditional theory of retrospective voting implicitly assumes that citizens are more concerned about actual outcomes than about the particular means of achieving those outcomes".

[3] The model disregards electoral control as a motivation for retrospective voting. This view of elections as a disciplining device can be found in Barro (1973) and Ferejohn (1986).

were reelected.[4] The second motivation accentuates a factor omitted by Downs, the government's competence. In this manner, Cukierman and Meltzer (1986), Rogoff and Sibert (1988), Rogoff (1990), and Persson and Tabellini (1990) argue that certain economic variables are noisy signals of the government's competence. If competence is persistent, it is rational to support the incumbent government when macroeconomic outcomes are better than expected. In such situations, there is a good chance that the competence of the government is high. However, the citizens in these models are assumed to be identical–an obvious drawback if one wants to explain voting on the individual level.

The model contains both of these explanations of retrospective voting and also allows for heterogeneity among the citizens. In particular I assume that the incumbent government redistributes income among the citizens in a way that is persistent through time. In combination with the information assumptions of the model, this implies that the income of each citizen will affect his vote.

The vast empirical literature on economic voting started with the contributions of Kramer (1971), Mueller (1970), and Goodhart and Bhansali (1970). After this breakthrough in the early 1970s, numerous aggregate studies have followed. Nannestad and Paldam (1994) call attention to four robust results: (1) people hold the government responsible for economic conditions, (2) in most cases, unemployment and inflation generate the most significant coefficients, (3) the voters' expectations are retrospective with a short time horizon, and (4) to rule costs popularity. However, aggregate studies only confirm that economics influences elections and do not distinguish between macro- and microeconomic conditions.[5]

[4] Alesina and Spear (1988) explain the consistency of a party's policies with a transfer scheme that is contingent on the incumbent's good behavior in an overlapping generations model. Harrington (1992) assumes that a lame duck incumbent prefers a successor from his own party and therefore refrain from implementing his own ideology since this reinforces the reputation of future candidates from his party.

[5] Since this paper investigates economic voting in Sweden, the evidence from this country is also worth mentioning. In addition to the early contributions of Åkerman (1946, 1947), at least four aggregate studies have been made on Swedish data. Frey (1979) reports that the rate of inflation and the rate of unemployment had a significant and negative impact on government popularity in

The first investigation of the relative impact of macro- and microeconomic variables on the vote was made by Kinder and Kiewiet (1979). They found that US voters responded almost exclusively to macroeconomic variables. Kinder and Kiewiet used survey data and their results have been corroborated in numerous similar studies. Most notably by Lewis-Beck (1988) in a comprehensive investigation of economic voting in Britain, France, Germany, Italy, Spain, and the United States. The only Swedish study based on survey data is Holmberg (1984). His conclusion is that economic factors were of some importance in the Swedish election of 1982. However, short-run changes in the perceived financial situation of the citizens offered only a minor explanation of their votes. Lewin (1991) reviews the aggregate and cross-sectional studies and concludes that the findings of relatively modest effects of microeconomic variables make the hypothesis of self-interest untenable. Another review, with a more cautious interpretation, is Nannestad and Paldam (1994).

A drawback with cross-sectional survey data is that macroeconomic variables are by definition constant across individuals. In view of this, researchers have chosen to work with perceptions of these variables. While it is true that perceptions–even if they are incorrect–matter in forming opinions, the link from changes in economic variables to changes in perceptions is clearly missing in these studies. If one wants to know how economic variables affect voting, it makes good sense to pool data from several elections. The pooling of cross-sections enables the incorporation of economic time series into the data set and estimation of the model using objective instead of subjective economic variables.

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the post-war years, whereas the growth of real income had a significant and positive impact in the same period. Considering the vote share of the incumbent government, only changes in the rate of unemployment had a significant (and negative) effect when all variables were simultaneously included in the model. Jonung and Wadensjö (1979) find that inflation and unemployment exerted a strong and negative influence on the support for the ruling Social Democratic Party during the period 1967–1976. In a similar study of nearly the same time period (1967–1978), Hibbs and Madsen (1981) find that the bloc of governing parties loses (gains) support when there are unexpected increases (decreases) in unemployment or inflation and gain (loses) support when there are unexpected increases (decreases) in disposable income growth relative to market income growth. This is in line with the findings in Madsen (1980)–that changes in the rate of unemployment, as opposed to the level of unemployment, had a negative and significant effect on the deviation from normal vote of the incumbent parties in the period 1920–1973.

Up to the present, the findings from studies based on pooled cross-sectional data do not tally with the findings from purely cross-sectional studies. Both Markus (1988, 1992), who uses data from the American National Election Studies between 1956 and 1988, and Nannestad and Paldam (1997a) who investigate data from 28 Danish quarterly surveys between 1986 and 1992, find that voters respond at least as much to micro- as to macroeconomic variables.[6] One explanation of this difference is that estimates based on survey responses may suffer from a simultaneity bias. In particular, an individual's perception of the macroeconomy might be affected by his vote choice. Strong supporters of the incumbent government might be inclined to adopt a relatively more favorable view of the state of the economy.

In this paper, I follow this most recent line of empirical research and estimate the model on pooled data from the Swedish Election Studies of 1985, 1988, 1991, and 1994 supplemented with time series on unemployment and inflation. Unlike the previous empirical studies, I present estimates based on panel data in addition to the estimates based on pooled cross sections. The most notable difference between the specifications with these different kinds of data is that the impact of macroeconomic variables on the vote is greater in the specifications with panel data than in the cross-sectional specifications. The results also indicate that Swedish citizens respond about as much to micro- as to macroeconomic variables when deciding how to vote. In particular, the experience of unemployment has a strong impact on the vote. Compared to a citizen who is employed, an unemployed citizen is much more likely to vote for a left-wing and against a right-wing incumbent government.

The rest of the paper is organized as follows. Section 2 introduces the theoretical model. In section 3 the model is estimated. Section 4 offers conclusions.

[6] Nannestad and Paldam (1997a, p 120) are more controversial and claim that "Danes are mainly pocketbook voters".

2. A Model of Rational Retrospective Voting

The following model explains economic voting by each citizen's self-interest alone. I assume that there are only two choices in an election: one left- and one right-wing alternative, one of which constitutes the incumbent government. The model focuses on the (incomplete) information of the citizens and in order to simplify the analysis, I do not explicitly model the behavior of the government. Instead, the government's competence and redistributive profile directly influence economic variables.[7]

Both real disposable income, $w_{i,t}$, and the identity of the government matter for citizens. This is captured by the following indirect utility function of a citizen:

$$V_{i,t} = w_{i,t} + g_t A_i, \tag{2.1}$$

where subindex i denotes a citizen, subindex t a time period, $g \in \{0, 1\}$ is an indicator variable which equals one if the government in the last period was reelected and A, the attitude towards the incumbent government, is citizen i's evaluation of this alternative on matters such as ideology, personality, and noneconomic policy issues. The citizens are rational and forward looking; each of them compares the expected utility of reelecting the incumbent government with the expected utility of electing the opposition.[8] Thus citizen i votes for the incumbent government if

$$E_t \left[w_{i,t+1} \mid g_{t+1} = 1 \right] + A_{i,t} > E_t \left[w_{i,t+1} \mid g_{t+1} = 0 \right], \tag{2.2}$$

where E_t denotes expectations conditional on what the citizen knows in period t. Each citizen is assumed to use historical data to forecast his income in the next time

[7] Obviously, such a model does not allow the government to signal its competence by policy choices.

[8] Since the citizens have only two alternatives to choose between and cannot influence the policy of the elected government, it is optimal to vote sincerely. The paper does not deal with "the paradox of voting" (see e.g. Downs, 1957 or Riker and Ordeshook, 1968). To evade the paradox, one could assume either that all citizens vote or that the model only describes the behavior of the citizens who make it to the polls.

period conditional on the identity of the elected government.[9] Since income depends on both the competence and the redistributive profile of the government, the vote will be influenced by forecasts of these characteristics of the government and the opposition. Although the government's competence and redistributive profile are not observed directly, certain economic variables provide signals of these characteristics. However, one difference between the two political alternatives is assumed to be known by the citizens–that social insurance is more generous under a left-wing government. This distinction between the degree of certainty of different political characteristics is thought to reflect the fact that some policies (e.g. transfers) have a direct (and thus more certain) impact on personal income, whereas other polices (e.g. economic policies in general) have a more indirect (and thus more uncertain) impact on personal income.

Following some of the literature on electoral cycles referred to in the introduction (especially Persson and Tabellini, 1990), I assume that the competence of the government influences economic variables. Moreover, competence is assumed to be persistent. To be precise, it is assumed to be a moving average given by

$$\kappa_t = \mu_t + g_t \mu_{t-1}, \tag{2.3}$$

where μ_t is a random shock with mean zero and variance σ_μ^2.[10] The assumption that competence is persistent is crucial but hardly unreasonable. The citizens observe κ_t with a one-period delay. Differences in competence between government and opposition reflect their different abilities to solve current economic problems. Competence is assumed to be a random variable since the nature of the economic

[9] The model is unrealistic in the sense that voters are often found to have a very vague knowledge about the state of the economy. The model may however be defended by referring to Sanders (2000), who argues that (British) voters are quite aware of the general macroeconomic situation and that their knowledge matters electorally.

[10] Fair (1978) finds that the economic performance of previous presidents from the opposition party does not influence the voters in US presidential elections.

problems changes over time.

Regarding macroeconomic variables, inflation and unemployment are the most obvious candidates to be included in the model since they are typically found to have the most significant effects (Paldam, 1997) and are almost always included in vote and popularity functions. Besides, unemployment is particularly suitable for this study due to its existence on the macro- as well as on the microeconomic level. Specifically, I assume that changes in the rate of inflation, $\Delta\pi$, and unemployment, ΔU, depend on the competence of the government. Since a new government "inherits" rates of inflation and unemployment, this seems to be a more reasonable approximation than to let the levels of these variables be influenced by the government's competence.[11] Thus, changes in inflation and unemployment are given by

$$\Delta\pi_t = -\kappa_t + \delta_t \tag{2.4}$$

and

$$\Delta U_t = -\kappa_t + \gamma_t, \tag{2.5}$$

where δ_t and γ_t are unobserved random variables with mean zero and variance σ_δ^2 and σ_γ^2. Furthermore, the relative change in the real income of each citizen, $\Delta w_{i,t}$, is supposed to be given by the following expression:

$$\Delta w_{i,t} = \kappa_t + u_{i,t}\alpha_{g,t} + \theta_{i,t} + \rho_{i,t}, \tag{2.6}$$

where $u_{i,t}$ is an indicator variable which equals one if citizen i is unemployed in time period t and equals zero otherwise, $\rho_{i,t} \sim \left(0,\sigma_\rho^2\right)$ is an idiosyncratic shock

[11] See Blanchard and Summers (1986) and Jackman et al (1991) for evidence of persistent unemployment, and Fuhrer and Moore (1995) for evidence of persistent inflation.

and $\alpha_{g,t} < 0$ is the impact of unemployment on the relative change in real income. Both $\alpha_{g,t}$ and the analogous characteristic of the opposition, $\alpha_{o,t}$, are assumed to be known by all citizens. Finally, $\theta_{i,t}$ is the net effect of redistribution to citizen i excluding unemployment insurance. Contrary to $\alpha_{g,t}$ and $\alpha_{o,t}$, $\theta_{i,t}$ is unknown to the citizen since it captures the effect of policies that have a more indirect impact on the citizen's income. This variable has the same dynamic structure as competence:

$$\theta_{i,t} = \nu_{i,t} + g_t \nu_{i,t-1}, \tag{2.7}$$

where $\nu_{i,t}$ is a random variable with mean zero and variance σ_ν^2. Each citizen observes $\nu_{i,t}$ with a delay of one period. All random variables are assumed to be independent.

In order to compare the government with the opposition, the citizens have to estimate the variables κ_t and $\theta_{i,t}$ on the basis of knowing only $\Delta\pi_t$, ΔU_t, $\Delta w_{i,t}$ and $u_{i,t}\alpha_g$ as well as the means, second moments and cross second moments of the random variables. Starting with κ_t, the citizens observe three signals of this random variable. Using linear least square projection (described in Appendix A), the best estimate of κ_t is

$$\hat{\kappa}_t = \frac{\sigma_\mu^2}{\Psi}\left(-\sigma_\gamma^2\left(\sigma_\nu^2 + \sigma_\rho^2\right)\Delta\pi_t - \sigma_\delta^2\left(\sigma_\nu^2 + \sigma_\rho^2\right)\Delta U_t + \sigma_\delta^2\sigma_\gamma^2\left(\Delta w_{i,t} - u_{i,t}\alpha_{g,t}\right)\right), \tag{2.8}$$

where $\Psi = \sigma_\delta^2\left(\sigma_\gamma^2\left(\sigma_\mu^2 + \sigma_\nu^2 + \sigma_\rho^2\right) + \sigma_\mu^2\left(\sigma_\nu^2 + \sigma_\rho^2\right)\right) + \sigma_\gamma^2\sigma_\mu^2\left(\sigma_\nu^2 + \sigma_\rho^2\right)$.[12] According to (2.8), each voter's expectation of the government's competence, $\hat{\kappa}_t$, is decreasing in $\Delta\pi_t$ and in ΔU_t but increasing in $\Delta w_{i,t}$. Comparing the weights of inflation and unemployment, we see that the noisier variable receives the smaller

[12] For convenience, we assume $\mu_{t-1} = 0$, which implies $\hat{\kappa}_t = \hat{\kappa}_{t+1}$. We also assume $\nu_{t-1} = 0$, which simplifies (2.9) and implies $\hat{\theta}_t = \hat{\theta}_{t+1}$.

weight. Intuitively, if $\sigma_\delta^2 > \sigma_\gamma^2$, a given change in unemployment contains more information on the government's competence than the same change in inflation. Likewise, contrary to the weight on $\Delta w_{i,t} - u_{i,t}\alpha_{g,t}$ the weights on $\Delta\pi_t$ and ΔU_t depend positively on σ_ν^2 and σ_ρ^2, since high variation in $\Delta w_{i,t}$ due to redistribution and chance reduces the information on κ_t contained in $\Delta w_{i,t} - u_{i,t}\alpha_{g,t}$. By the same logic, the weight on $\Delta w_{i,t} - u_{i,t}\alpha_{g,t}$ increases in σ_δ^2 and in σ_γ^2

Next, each citizen's knowledge of $\Delta\pi_t$, ΔU_t, $\Delta w_{i,t}$ and $u_{i,t}\alpha_g$ also provides information on $\theta_{i,t}$ and therefore, according to (2.7), on the expectation of $\theta_{i,t+1}$ (if the government is reelected). The solution of this signal extraction problem is:

$$\hat{\theta}_{i,t} = \frac{\sigma_\nu^2}{\Psi}\left(\sigma_\gamma^2\,\sigma_\mu^2\,\Delta\pi_t + \sigma_\delta^2\,\sigma_\mu^2\,\Delta U_t + \left(\left(\sigma_\gamma^2 + \sigma_\delta^2\right)\sigma_\mu^2 + \sigma_\delta^2\,\sigma_\gamma^2\right)\left(\Delta w_{i,t} - u_{i,t}\alpha_{g,t}\right)\right). \tag{2.9}$$

Equation (2.9) tells us that the estimate of $\theta_{i,t}$ is increasing in $\Delta\pi_t$ and ΔU_t since rising inflation and unemployment decreases the estimate of κ_t, making it more likely that a higher wage is due to redistribution. The ratio of these weights is the same as in (2.8). Moreover, the weight on $\Delta w_{i,t} - u_{i,t}\alpha_{g,t}$ is greater than the weights on $\Delta\pi_t$ and ΔU_t since $\Delta w_{i,t}$ depends on both κ_t and $\theta_{i,t.}$

By substituting the estimates $\hat{\kappa}_{t+1}$ (2.8) and $\hat{\theta}_{i,t+1}$ (2.9) into (2.2), one gets a more specific condition for supporting the government:

$$A_i + Pr\left[u_{i,t+1}\right]\left(\alpha_{g,t} - \alpha_{o,t}\right) + \frac{1}{\Psi}\left(\begin{array}{c} -\sigma_\mu^2\,\sigma_\gamma^2\,\sigma_\rho^2\,\Delta\pi_t - \sigma_\mu^2\,\sigma_\delta^2\,\sigma_\rho^2\,\Delta U_t \\ + \left(\sigma_\mu^2\left(\sigma_\delta^2\left(\sigma_\nu^2 + \sigma_\gamma^2\right) + \sigma_\nu^2\,\sigma_\gamma^2\right) + \sigma_\nu^2\,\sigma_\delta^2\,\sigma_\gamma^2\right)\left(\Delta w_{i,t} - u_{i,t}\alpha_{g,t}\right) \end{array}\right) > 0. \tag{2.10}$$

This condition states that a citizen is more likely to support an incumbent government if his attitude towards it is more positive than his attitude towards the opposition ($A_i > 0$). He is also more likely to support the government if the rate of

inflation or unemployment has decreased or if his own income has increased. Regarding unemployment on the personal level there are two effects at work. First, experience of unemployment increases the support for a left-wing incumbent government, since in this case $\alpha_{g,t} - \alpha_{o,t} > 0$ and we assume $\Pr[u_{i,t+1} = 1 \mid u_{i,t} = 1] \geq \Pr[u_{i,t+1} = 1 \mid u_{i,t} = 0]$. Second, the experience of unemployment ($u_{i,t} = 1$) increases the estimates of competence, $\hat{\kappa}_{t+1}$, and net redistribution, $\hat{\theta}_{i,t+1}$, for a given change in real income (since $\alpha_{g,t} < 0$). The interaction of the two effects is such that the left hand side of (2.10) is greater for $u_{i,t} = 1$ than for $u_{i,t} = 0$ if there is a left-wing government. With a right-wing government it is ambiguous whether the expression is greater for $u_{i,t} = 1$ or $u_{i,t} = 0$. It is more likely to be greater for $u_{i,t} = 0$ if $\Pr[u_{i,t+1} = 1 \mid u_{i,t} = 1]$ is considerably greater than $\Pr[u_{i,t+1} = 1 \mid u_{i,t} = 0]$ or if $\alpha_{g,t}$ is much smaller than $\alpha_{o,t}$.

The model can be estimated as a model for binary choice if a disturbance term is added to (2.10). This estimation is done in the next section. Equation (2.10) also formally confirms that even if citizens are motivated by self-interest, macroeconomic variables can indeed be expected to influence their votes. Regarding the relative impact of changes in the macroeconomic variables, we expect the variance of the changes in inflation and unemployment to be the determining factor. From (2.4) and (2.5), we see that the variable with the greater variance contains less information on competence. In consequence, the model predicts that a citizen in the voting booth reacts less to a given change in this variable.

3. Empirical Investigation

3.1. Data

The data set[13] contains information on individuals from the four most recent Swedish Election Studies (1985, 1988, 1991 and 1994)[14] complemented with time series on inflation, unemployment and real GDP growth for the same period of time. The election studies are made in the form of a two-step panel in which each respondent is interviewed twice and one half of them is replaced in each study. The population of the Swedish Election Studies is the Swedish electorate (aged 18–80) and the nonresponse rate ranges between 18.2 and 27 percent (in 1982 and 1991). Since the all of the economic variables of interest are not included in the election study of 1982, it is not meaningful to go further back in time than 1985. In three of the four terms of office under study the government is classified as left-wing. The last term of office (1991–94) is the exception with a governing coalition which is classified as right-wing. Consequently, the governing coalition retained its majority in the elections of 1985 and 1988, whereas the elections of 1991 and 1994 resulted in a transfer of power.

Although Sweden has a multi-party system, I follow the common practice[15] of treating it as a two-bloc system.[16] For the period of study, this does not seem to violate the actual situation in the Swedish Parliament very much. The dependent variable in all estimations is choice of political bloc. Votes for one of the parties in the bloc with a majority in parliament are coded one and votes for other parties are

[13] The major part of the data in this paper has been made available by the Swedish Social Science Data Service (SSD). The data in the Swedish Election Studies was originally collected in a research project at the Department of Political Science at Göteborg University, under the guidance of Sören Holmberg and Mikael Gilljam. Neither SSD nor the primary researchers are responsible for the analyses presented in this paper.

[14] In one case I also use data from the election study of 1982 in order to compute the variable $\Delta w_{i,t}$.

[15] See e.g. Alesina et al. (1997), Laver and Schofield (1990), Johansson (1999) and Pettersson Lidbom (2000).

[16] The left-wing bloc includes the Social Democratic Party, the Leftist Party and the Green Party. The right-wing bloc includes the Conservative Party, the Centrist Party, the Liberal Party, the Christian Democratic Party and the New Democratic Party.

coded zero. The independent variables ΔU_t, $\Delta \pi_t$, $\Delta w_{i,t}$, $Left$, $Right$ are objective, whereas the other independent variables, $P(Macro)$, $P(Micro)$, and $u_{i,t}$, are subjective (P indicates the perception of the variable). As in the related literature, the control variable for political preferences or attitudes, *Attitude*, is constructed from sociodemographic characteristics. A description of all the variables is given in Appendix B.

3.1.1. Estimates Based on Pooled Cross Sections

Although cross sectional data have the well known drawback that estimation results may be biased in the presence of unobserved individual heterogeneity, I present such results in order to compare them with previous studies and with estimates based on panel data. Because of this intention, most of the sensitivity analysis don't appear until the estimates based on panel data are presented. In accordance with the theoretical analysis of the previous section, I estimate the model with the probit model of binary choice. Due to data limitations, it is not possible to estimate the model with objective data only. Because of this and also in order to address the issue of sensitivity to different specifications, I report estimation results from three specifications with different combinations of subjective and objective economic variables.

The first specification includes two objective macroeconomic variables, changes in the rates of unemployment and inflation (ΔU_t and $\Delta \pi_t$) together with a subjective microeconomic measure of the self-reported change in the financial situation of the citizen's houshold. This variable, $P\,(Micro)$, is trichotomous: "worse" is coded -1, "about the same" is coded 0, and "better" is coded 1. Thus, the first specification of the model is:

$$\Pr(Vote = 1) = \Phi\left(a + b_1\Delta U_t + b_2\Delta\pi_t + c_1 P(Micro) + c_2(Left * u_{i,t}) + c_3(Right * u_{i,t}) + dA_i\right), \tag{3.1}$$

where Φ is the cumulative standard normal distribution, $Left$ and $Right$ are dummy variables indicating left- and right-wing governments, and A_i denotes the control variable *Attitude*. The dependent variable $Vote$ equals one if the citizen votes for the incumbent government and zero otherwise. Coefficients for macroeconomic variables are indicated b and coefficients for microeconomic variables are indicated c.

In the second specification I switch to using an objective measure of $\Delta w_{i,t}$, the percentage change in real income net of taxes since the previous election. Unfortunately, the data on income are not as exact in the election study of 1988 as it is in the other studies. Therefore estimation with $\Delta w_{i,t}$ as one of the independent variables is restricted to the elections of 1985 and 1994. Because of this, I use a subjective measure of changes in macroeconomic conditions instead of ΔU_t and $\Delta\pi_t$ in this specification. This subjective variable $P(Macro)$ is trichotomous with the same coding as the analogous variable $P(Micro)$. Thus, the second specification is:

$$\Pr(\text{vote=1}) = \Phi\left(a + b_1 P(Macro) + c_1\Delta w_{i,t} + c_2(Left * u_{i,t}) + c_3(Right * u_{i,t}) + dA_i\right). \tag{3.2}$$

The third specification contains both of the mentioned subjective measures and is written as follows:

$$\Pr(\text{vote=1}) = \Phi\left(a + b_1 P(Macro) + c_1 P(Micro) + c_2 (Left * u_{i,t}) + c_3 (Right * u_{i,t}) + dA_i\right). \tag{3.3}$$

The theoretical model predicts b_1 and b_2 in the first specification to be negative and b_1 in the other two specifications to be positive. In all specifications, c_1 and c_2 are predicted to be positive. Regarding a and c_3, the predicted signs are ambiguous, but, for reasons explained in the previous section, we expect $c_3 < c_2$.

Table 1 displays the estimation results. Column 1 contains the estimates from the first, column 2 from the second, and column 3 from the third specification.[17] For all specifications, the signs of the estimated coefficients are consistent with the predictions of the theoretical model. In the first and in the third specification all coefficients are also statistically significant at the five percent level (except for $Right * u_{i,t}$ whose sign was expected to be ambiguous). For the second specification the picture is less clear; neither the coefficient for $\Delta w_{i,t}$ nor the one for $Left * u_{i,t}$ is significantly different from zero. However, the small and insignificant coefficient for $\Delta w_{i,t}$ may well be due to a shortcoming in the income measure. The election studies contain the respondents' income in the year before the election, which is unfortunate since the empirical evidence suggests that the effect of changing economic conditions is of a short duration (see e.g. Paldam, 1997).

[17] Allowing observations from the same year to be dependent (but still assuming independence across years) does not change the levels of statistical significance in Table 1 in any important way.

Table 1 Estimates from pooled cross sections

		1	2	3
Macroeconomic	ΔU_t	-.046**		
variables		(.012)		
	$\Delta \pi_t$	-.022**		
		(.006)		
	P(Macro)		.531**	.383**
			(.044)	(.028)
Microeconomic	$\Delta w_{i,t}$		.007	
variables			(.008)	
	P(Micro)	.175**		.110**
		(.030)		(.031)
	Left*$u_{i,t}$	.751**	.869	.756**
		(.267)	(.558)	(.276)
	Right*$u_{i,t}$	-.440*	-.367	-3.09
		(.212)	(.211)	(.209)
Control variable	Attitude	2.809**	3.138**	2.823**
		(.120)	(.179)	(.122)
	Constant	-1.487**	-1.437**	-1.404**
		(.069)	(.097)	(.067)
	Elections	1985—94	1985, 1994	1985—94
	Log likelihood	-2,089	-941	-2,002
	Correct predictions	69.0%	72.8%	70.4%
	# Observations	3522	1747	3522

Probit model. The dependent variable vote is coded 1 for government and 0 for opposition. Standard errors are in parentheses. * indicates significance at the 5% level. ** indicates significance at the 1% level.

It is also worth noting that c_3, the coefficient for $Right * u_{i,t}$, in all cases turned out to be smaller than c_2 just as the model predicted. Moreover, in none of the specifications it is possible to reject the hypothesis $c_2 = -c_3$ by a Wald test.[18] This may be interpreted as an indication that the experience of unemployment only influences the vote through differences in expected provision of insurance against unemployment and not through estimates of competence and net redistribution. Within the framework of the model, this means that the only effect of unemployment appears to work through the term $\Pr[u_{i,t+1}]\,(\alpha_{g,t} - \alpha_{o,t})$ in equation (2.10). Because of the more generous social insurance under a left-wing government, this term switches sign (from positive to negative) when such a government is replaced by a right-wing government and vice versa.

Finally we note that the coefficient for ΔU_t is considerably larger than the coefficient for $\Delta\pi_t$ (in absolute values). Since the variance of ΔU_t is only a fraction of the variance of $\Delta\pi_t$, this is exactly what the model predicts (see equation 2.10).

Further interpretation of the estimated coefficients is facilitated by comparing predicted probabilities for different sets of values of the explanatory variables. Since the probit model is nonlinear, the partial derivatives of the probabilities with respect to the explanatory variables depend on the values of all explanatory variables. Tables 2, 3, and 4 display predicted probabilities which indicate the potential impact on the vote of changes in the variables of interest (evaluated at focal values of the other explanatory variables). In all of the specifications, the experience of unemployment under a left-wing government ($Left * u_{i,t} = 1$) has a considerable impact on the vote although the standard errors are quite large. The tables also reveal that the potential impact on the predicted probabilities are greater for subjective economic variables ($P\,(Macro)$ and $P\,(Micro)$) than for objective economic variables (ΔU_t, $\Delta\pi_t$ and $\Delta w_{i,t}$). This is especially evident for the impact of changes

[18] In none of the specifications does $u_{\mathrm{i,t}}$ enter significantly if we let it replace the variables $Left * u_{\mathrm{i,t}}$ and $Right * u_{\mathrm{i,t}}$.

in the microeconomic situation ($P\,(Micro)$ and $\Delta w_{i,t}$), which is substantial in Table 2 and 4 but minute in Table 3.

Table 2 Predicted probabilities to vote for the government in the first cross sectional specification

		min	- st. dev.	mean*	+ st. dev.	max
Macroeconomic	ΔU_t	.515	.506	.463	.421	.405
variables		(.009)	(.014)	(.009)	(.014)	(.018)
	$\Delta \pi_t$	.494	.500	.463	.427	.410
		(.013)	(.014)	(.009)	(.013)	(.017)
Microeconomic	$P(Micro)$	.395		.463		.533
variables		(.015)		(.009)		(.015)
	$Left \times u_{i,t}$	.463				.745
		(.009)				(.086)
	$Right \times u_{i,t}$	.463				.297
		(.009)				(.073)

Each row of the table shows how the probability to vote for the government changes when certain variables are varied and the others are held constant. The first row, for example, shows that this probability is .405 when ΔU_t is at its maximum and .515 when it is at its minimum. Probabilities are based on column 1 in Table 1. In each case, the other variables are assigned the following values: ΔU_t= 1.5 (mean), $\Delta \pi_t$= -2.101 (mean), $P(Micro) = 0$ (midpoint), $Left \times u_{i,t}$= 0, $Right \times u_{i,t}$= 0, $Attitude = .505$ (mean). Standard errors (calculated with the "delta method") are in parentheses.

* midpoint in the case of $P(Micro)$.

Table 3 Predicted probabilities to vote for the government in the second cross sectional specification

		min	25th percentile	0	75th percentile	max
Macroeconomic	$P(Macro)$	.350		.558		.751
variable		(.015)		(.016)		(.023)
Microeconomic	$\Delta w_{i,t}$		.558	.558	.559	
variables			(.016)	(.016)	(.016)	
	$Left \times u_{i,t}$	.558				.845
		(.016)				(.140)
	$Right \times u_{i,t}$	.558				.413
		(.016)				(.082)

Each row of the table shows how the probability to vote for the government changes when certain variables are varied and the others are held constant. The first row, for example, shows that this probability is .751 when $P(Macro)$ is at its maximum. Probabilities are based on column 2 in Table 1. In each case, the other variables are assigned the following values: $P(Macro) = 0$ (midpoint), $\Delta w_{i,t} = 0$, $Left \times u_{i,t} = 0$, $Right \times u_{i,t} = 0$, $Attitude = .505$ (mean). Standard errors (calculated with the "delta method") are in parentheses.

Table 4 Predicted probabilities to vote for the government in the third cross sectional specification

		min	midpoint	max
Macroeconomic	$P(Macro)$	.359	.509	.657
variable		(.011)	(.010)	(.016)
Microeconomic	$P(Micro)$	.465	.509	.552
variables		(.016)	(.010)	(.015)
	$Left \times u_{i,t}$	.509		.782
		(.010)		(.081)
	$Right \times u_{i,t}$	.509		.387
		(.010)		(.080)

Each row of the table shows how the probability to vote for the government changes when certain variables are varied and the others are held constant. The first row, for example, shows that this probability is .657 when $P(Macro)$ is at its maximum. Probabilities are based on column 3 in Table 1. In each case, the other variables are assigned the following values: $P(Macro) = 0$ (midpoint), $P(Micro) = 0$ (midpoint), $Left \times u_{i,t} = 0$, $Right \times u_{i,t} = 0$, $Attitude = .505$ (mean). Standard errors (calculated with the "delta method") are in parentheses.

Even though the estimates are sensitive to the empirical specification of the model, the estimates clearly suggests that both macro- and microeconomic variables influence voting behavior substantially. In particular, it is not possible to claim that the impact of microeconomic variables on the vote is negligible. Obviously it is difficult to compare the effects of the macro- and the microeconomic variables on the vote. One has to accept a certain amount of arbitrariness in order to make the quantitative and qualitative variables comparable. In order to make such a comparison, Table 2 contains predicted probabilities for values of ΔU_t and $\Delta \pi_t$ that are one standard deviation above and below the means of these variables. Comparing a "standard change", where one of these variables increases from

its mean to a value of one standard deviation above its mean, with a one unit change in the microeconomic variables $P(Micro)$ and $Left \times u_{i,t}$, the effects of the microeconomic variables appear to be greater in this specification. In the second specification, the effect of the macroeconomic variable $P(Macro)$ appears to be greater than the effects of microeconomic variables (Table 3), but the mentioned drawbacks to the variable $\Delta w_{i,t}$ makes this comparison less interesting. In the third specification (Table 4), it is true that the effect of $P(Macro)$ is greater than the effect of $P(Micro)$, but the largest effect is the one of $Left \times u_{i,t}$. Thus in the two most interesting of the three specifications, changes in microeconomic variables affect the predicted probability to vote for the government more than "standard" changes in macroeconomic variables do.

3.2. Estimates Based on Panel Data

Since each respondent in the Swedish Election Studies is interviewed twice, it is possible to use panel data when estimating the model in order to control for unobserved individual heterogeneity. I apply the random effects probit model. With panel data, the dependent variable $Vote$ is recoded to indicate choice of bloc (left-wing=1) since it is reasonable to interpret the unobserved heterogeneity as the individual's political bias in favor of one of the blocs (I have chosen the left-wing bloc). Thus, it is no more necessary to include the control variable *Attitude*. In consequence of this change, the variables ΔU_t, $\Delta \pi_t$, $P(Macro)$ and $P(Micro)$ are interacted with incumbency status (left- or right-wing) in order to enter the specifications as predicted by the theoretical model. Using the whole unbalanced panel, estimates from three different specifications are presented.

The first specification contains the objective macroeconomic variables ΔU_t and $\Delta \pi_t$ together with the subjective microeconomic variables $P\,(Micro)$ and $u_{i,t}$. Thus, the first specification using panel data is:

$$\Pr(Vote = 1) = \Phi(a + I_t(b_1\Delta U_t + b_2\Delta\pi_t + c_1 P(Micro)) + c_2 u_{i,t} + d_i), \quad (3.4)$$

where I_t is an indicator variable which equals one in 1985, 1988 and 1991 (when there were left-wing governments) and negative one in 1994 (when there was a right-wing government) and d_i is the individual random effect.

As a sensitivity check, the second specification also contains the annual growth of real GDP, a variable which is often included in voting models:

$$\Pr(Vote = 1) = \Phi(a + I_t(b_1\Delta U_t + b_2\Delta\pi_t + b_3\Delta GDP_t + c_1 P(Micro)) + c_2 u_{i,t} + d_i). \quad (3.5)$$

The third specification contains subjective variables only and is written:

$$\Pr(Vote = 1) = \Phi(a + I_t(b_1 P(Macro) + c_1 P(Micro)) + c_2 u_{i,t} + d_i). \quad (3.6)$$

Table 5 displays the estimation results. Column 1 contains the estimates from the first, column 2 from the second and column 3 from the third specification. For all specifications, the signs of the estimated coefficients are consistent with the predictions of the theoretical model. All coefficients except two are also statistically significant at the five percent level. The first exception is the coefficients for ΔGDP_t in the second specification. This supports the choice of only including the changes in unemployment and inflation in the model. The second exception is the coefficient for $u_{i,t}$ in the third specification, which is marginally insignificant at the 10 percent confidence level. A disadvantage with the third specification is that the macroeconomic variable is subjective, which may open the door for perception bias.

Compared to the cross sectional estimates in Table 1, the coefficients for the macro-economic variables, ΔU_t, $\Delta \pi_t$ and $P(Macro)$, are greater, whereas the impact of personal unemployment is a bit smaller.

As a small sensitivity analysis, I have estimated the first and the third specification on a balanced panel and for two shorter time periods. When reducing the data set to a balanced panel with 3,706 observations, the only important difference compared with the estimates in Table 5 is that the coefficient for $u_{i,t}$ is marginally insignificant at the 5 percent level in the first specification. When excluding the first step of the unbalanced panel (individuals observed in 1985 and 1988), the same coefficient is not statistically significant at the five percent level. When instead excluding the last step of the panel (individuals observed in 1991 and 1994), the coefficient for $\Delta \pi_t$ is no longer statistically significant in the first specification, whereas the coefficient for $u_{i,t}$ becomes statistically significant at the one percent level both in the first and in the third specification. The estimates from this sensitivity analysis are found in Appendix C.[19][20]

Inspired by the "grievance asymmetry" found among Danish voters by Nannestad and Paldam (1997b), I have also conducted tests for asymmetric effects of economic improvements and deteriorations. The tests only reveal such a pattern for the variable P(Micro) in the third specification, and never for the variable P(Macro). In the third specification, only deteriorations in the personal financial situation were found to influence the vote.

[19] Note that the exclusion of the last step of the panel (individuals observed in 1991 and 1994) enables us to test Hibbs' (1987) differential partisan capability approach (since 1994 was the only election with an incumbent right-wing government). Altough, the statistically insignificant effect of $\Delta \pi_t$ (see Appendix C) when making this exclusion is in line with Hibbs' approach, the support for leftist parties was still found to be negatively correlated with ΔU_t, which contradicts the hypothesis that the support of a left-wing government should be unaffected or perhaps even increased by unfavourable changes in unemployment. According to my results, it is only on the personal level that unemployment increases the probability to vote for a left-wing government as such. This is also the case if only the observations in 1994 are excluded.

[20] Note also that the estimated coefficients and their standard errors in the first specification (Table 5, column 1) hardly change at all if I use an expanded definition of unemployment which also includes people in short term labor market programmes in addition to the the official unemployment figures that are used throughout this paper.

Table 5 Panel Estimates

		1	2	3
Macroeconomic	ΔU_t	-.181**	-.182**	
variables		(.012)	(.012)	
	$\Delta \pi_t$	-.071**	-.082**	
		(.006)	(.017)	
	ΔGDP		-.066	
			(.090)	
	$P(Macro)$			.543**
				(.027)
Microeconomic	$P(Micro)$	.165**	.163**	.079**
variables		(.030)	(.030)	(.030)
	$u_{i,t}$	.322*	.323*	.210
		(.153)	(.122)	(.148)
	$Constant$	-.144**	-.056**	-.106**
		(.027)	(.122)	(.025)
	Elections	1985—94	1985—94	1985—94
	Log likelihood	-3,665	-3,665	-3,605
	Correct predictions	61.0%	61.0%	63.5%
	# Observations	5,700	5,700	5,700
	ρ	.482	.480	.443

Random effects probit model. The dependent variable vote is coded 1 for left-wing and 0 for right-wing governments. The variables ΔU_t, $\Delta \pi_t$, $P(Macro)$, and $P(Micro)$ are interacted with the identity of the incumbent government so that the coefficients represent the impact on the propensity to vote for the incumbent government. Standard errors are in parentheses. * indicates significance at the 5% level. ** indicates significance at the 1% level. ρ is the proportion of the total variance contributed by the panel-level variance component.

As was evident in the previous subsection, the estimated coefficients are easier to interpret if we compare predicted probabilities for different sets of values of the explanatory variables. Table 6, 7, and 8 display such predicted probabilities which indicate the potential impact on the vote of certain changes in the variables of interest. The striking dissimilarity to the potential impacts in Table 2 and 4 is the considerable impact of changes in ΔU_t (Table 6). The impact of $P(Macro)$ is also greater than it was with cross sectional data, although this difference is less dramatic. Thus the application of panel data indicates a greater importance of macroeconomic variables than is the case with pooled cross sections.

Table 6 Predicted probabilities to vote for the left-wing bloc in the first panel specification

		min	- st. dev.	mean*	+ st. dev.	max
Macroeconomic	ΔU_t	.599	.565	.397	.247	.199
variables		(.012)	(.012)	(.013)	(.017)	(.018)
	$\Delta \pi_t$	.499	.517	.397	.286	.241
		(.018)	(.019)	(.013)	(.013)	(.014)
Microeconomic	$P(Micro)$	.335		.397		.462
variables		(.017)		(.013)		(.017)
	$u_{i,t}$	.397				.540
		(.013)				(.059)

Each row of the table shows how the probability to vote for the left-wing bloc changes when certain variables are varied and the others are held constant. The first row, for example, shows that this probability is .199 when ΔU_t is at its maximum. Probabilities are based on column 1 in Table 6. In each case, the other variables are assigned the following values: $\Delta U_{i,t} = 1.5$ (mean), $\Delta \pi_t = 2.101$ (mean), $P(Micro) = 0$ (midpoint), $u_{i,t} = 0$. Standard errors (calculated with the "delta method") are in parentheses.

* midpoint in the case of $P(Micro)$.

Table 7 Predicted probabilities to vote for the left-wing bloc in the third panel specification

		min	midpoint	max
Macroeconomic	$P(Macro)$	.258	.457	.669
variable		(.012)	(.010)	(.013)
Microeconomic	$P(Micro)$	.427	.457	.489
variables		(.016)	(.010)	(.015)
	$u_{i,t}$	.457		.542
		(.010)		(.058)

Each row of the table shows how the probability to vote for the left-wing bloc changes when certain variables are varied and the others are held constant. The first row, for example, shows that this probability is .669 when $P(Macro)$ is at its maximum. Probabilities are based on column 3 in Table 6. In each case, the other variables are assigned the following values: $P(Macro) = 0$ (midpoint), $P(Micro) = 0$ (midpoint), $u_{i,t}$= 0. Standard errors (calculated with the "delta method") are in parentheses.

We also want to make the same kind of comparisons between the effects of the macro- and microeconomic variables as was done with the cross-sectional specifications. In the first panel specification (Table 6), the effect on the vote of a "standard" decrease in ΔU_t from its mean to one standard deviation below its mean is about as great as the effect of the dummy variable $u_{i,t}$. At the same time, the effect of the same decrease in $\Delta\pi_t$ is somewhat greater then the effect of a one unit increase in the other microeconomic variable $P(Micro)$. Thus the effect of macroeconomic variables appears to be roughly as great as the effect of microeconomic variables in this specification. In the third panel specification on the other hand (Table 7), the effect of the subjective macroeconomic variable $P(Macro)$ is considerably greater than the effect of the subjective macroeconomic variable $P(Micro)$. Thus the relative

sizes of the macro- and the microeconomic effects depend on the chosen empirical specification. I am however inclined to put more weight on the specification with objective macroeconomic variables since it eliminates perception biases from these variables.

3.3. The Impact on Election Outcomes

So far, the analysis has focused on individual vote choice. In order to assess the capacity of different variables to affect election outcomes we need to consider the aggregate effect of changes in the explanatory variables. Due to the close connection between the variables ΔU_t and $u_{i,t}$, I have chosen to investigate whether unemployment influences election outcomes mainly because rising unemployment makes everybody believe that the government is less competent or mainly because the unemployed vote differently than the employed. In addition, the personal unemployment variable $u_{i,t}$ is more likely than $P(Micro)$ to affect election outcomes, since many of the individual effects of the latter variable cancel out in the aggregate.

According to the model, the total effect of unemployment depends on the identity of the incumbent government. With a left-wing government, the negative macroeconomic effect of rising unemployment is mitigated by the positive effect of the increased support for the government among the unemployed. With a right-wing government on the other hand, the macro- and the microeconomic effect reinforce each other. Even if the experience of unemployment has about the same potential to influence on individual vote choice as changes in the rate of unemployment have, the latter variable affects every voter and may therefore be more important for election outcomes.

In Table 8, the macro- and microeconomic effects of unemployment on election outcomes are compared by predicting the outcomes in the four elections under the counterfactual absence of one of these effects at a time. Obviously such a specula-

tive exercise can only provide us with a very crude measure of actual and potential influences on election outcomes. Table 8 displays predicted vote shares in a hypothetical case when nobody is unemployed ($u_{i,t} = 0\ \forall i$) and in another hypothetical case when the rate of unemployment is constant ($\Delta U_t = 0$) for estimates based on cross sectional and panel data. The cross sectional estimates have much smaller prediction errors (especially in 1991). This is due to the absence of the control variable *Attitude* in the specifications based on panel data. The differences between the conditional and unconditional vote shares suggest that the total macroeconomic effect of unemployment has been larger than the total microeconomic effect. However, the total microeconomic effect of unemployment is not negligible. An additional percentage point of the votes can very well be decisive in close races.

Table 8 The Governing Coalition's Share of the Vote*

		Cross section			Panel		
Year	Actual Vote Share	Predicted Vote Share	Predicted given u=0 ∀ i	Predicted given ΔU=0	Predicted Vote Share	Predicted given u=0 ∀ i	Predicted given ΔU=0
1985	51.1%	49.3%	48.8%	49.4%	51.7%	51.5%	53.9%
1988	56.5%	54.3%	54.0%	53.7%	59.0%	58.9%	54.8%
1991	44.1%	45.1%	44.7%	46.7%	24.6%	24.3%	34.5%
1994	42.3%	43.5%	44.4%	47.9%	36.6%	37.4%	68.5%

The table is based on the estimates in column 1 in Table 1 and in Table 5.

*among the parties that won seats in parliament

4. Concluding Remarks

The empirical results which are based on pooled cross-sections confirm the findings in Markus (1988, 1992), and Nannestad and Paldam (1997a) that microeconomic variables influence voting decisions about as much as macroeconomic variables do. Especially the experience of unemployment appears to have a considerable influence on the vote. The unemployed tend to support left-wing and oppose right-wing governments. This is roughly in accordance with Nannestad and Paldam (1995), who find that unemployed Danish voters turned away from Conservative-led but not from Social Democratic-led governments.

For well known reasons, panel data exhibits several advantages which make the results from panel estimations more reliable than cross-sectional results. Compared to the empirical results based on cross-sections, the results that are based on panel data indicate a stronger impact of macroeconomic variables. In the most plausible specification, the effects of the macroeconomic variables are about as great as the effects of the microeconomic variables.

Thus, the findings in this paper strike a balance between the "pocketbook" and the altruistic view of voting. In particular the results cast doubt on claims in previous studies that changes in individual financial conditions have a minimal impact on the vote. In fact, even if responses to macroeconomic variables are assumed to be due to a concern for fellow citizens, which itself is far from clear, self-interest still can be about as important for individual vote choice as is such an altruistic concern.

Previously, the relative importance of self-interest as a vote motive has been found to differ substantially from one country to the next. Since this is the first paper to investigate economic voting by applying panel data, there is an obvious need for similar research for other countries. Nevertheless, the fact that Swedes appear to be more pocketbook oriented than Americans have been found to be, can be

interpreted by the culture hypothesis of Nannestad and Paldam (1997a). According to this hypothesis, Swedes find it more natural to hold the government responsible for economic changes when compared with the more individualistic Americans. Indeed, a distinguishing feature a welfare state is that the public sector actively tries to influence the welfare of the citizens.

Regarding the effects of unemployment on election outcomes, the macroeconomic effect of unemployment appear to have a much larger potential of influencing outcomes compared with the microeconomic effect. The total microeconomic effect of unemployment is, however, not negligible.

Appendix A Linear Projections

A citizen has to estimate κ_t and $\theta_{i,t}$ on the basis of knowing $\Delta\pi_t$, ΔU_t and $(\Delta w_{i,t} - u_{i,t}\alpha_{g,t})$. Since the citizen is supposed to know the means, second moments and cross second moments of these variables, he can solve the problem by using linear regression. In general, the linear least squares projection of a random variable y on n+1 random variables $x_0, x_1, ..., x_n$ $(x_0 \equiv 1)$ is denoted $P[y \mid x_0, x_1, ..., x_n]$ and is found by minimizing

$$E\left(y - (a_0 + a_1x_1 + ... + a_nx_n)\right)^2 \tag{A1}$$

with respect to $a_0, a_1, ..., a_n$. The solution to this problem is given by the orthogonality principle (see e.g. Sargent, 1979). This principle states a set of necessary and sufficient conditions for $a_0, a_1, ..., a_n$ to minimize (A1), viz.

$$E\left[\left(y - (a_0 + a_1x_1 + ... + a_nx_n)\right)x_i\right] = 0, \quad i = 0, ..., n. \tag{A2}$$

In our case of estimating κ, rearranging the orthogonality conditions in (A2) yields:

$$\begin{bmatrix} E[\kappa] \\ E[\kappa\Delta\pi] \\ E[\kappa\Delta U] \\ E[\kappa(\Delta w\prime)] \end{bmatrix} = \begin{bmatrix} 1 & E[\Delta\pi] & E[\Delta U] & E[\Delta w\prime] \\ E[\Delta\pi] & E\left[\Delta\pi^2\right] & E[\Delta\pi\Delta U] & E[\Delta\pi(\Delta w\prime)] \\ E[\Delta U] & E[\Delta\pi\Delta U] & E\left[\Delta U^2\right] & E[\Delta U(\Delta w\prime)] \\ E[\Delta w'] & [\Delta\pi(\Delta w\prime)] & E[\Delta U(\Delta w\prime)] & E\left[(\Delta w\prime)^2\right] \end{bmatrix} \begin{bmatrix} a_0 \\ a_1 \\ a_2 \\ a_3 \end{bmatrix}, \tag{A3}$$

where $w' = \Delta w_{i,t} - u_{i,t}\alpha_{g,t}$ and subindices are omitted. Using the relations in (2.3), (2.4), (2.5), (2.6) and (2.7), these equations can be written

$$\begin{bmatrix} 0 \\ -\sigma_\mu^2 \\ -\sigma_\mu^2 \\ \sigma_\mu^2 \end{bmatrix} = \begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & \sigma_\mu^2+\sigma_\delta^2 & \sigma_\mu^2 & -\sigma_\mu^2 \\ 0 & \sigma_\mu^2 & \sigma_\mu^2+\sigma_\gamma^2 & -\sigma_\mu^2 \\ 0 & -\sigma_\mu^2 & -\sigma_\mu^2 & \sigma_\mu^2+\sigma_\nu^2+\sigma_\rho^2 \end{bmatrix} \begin{bmatrix} a_0 \\ a_1 \\ a_2 \\ a_3 \end{bmatrix}. \tag{A4}$$

Since $\begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & \sigma_\mu^2+\sigma_\delta^2 & \sigma_\mu^2 & -\sigma_\mu^2 \\ 0 & \sigma_\mu^2 & \sigma_\mu^2+\sigma_\gamma^2 & -\sigma_\mu^2 \\ 0 & -\sigma_\mu^2 & -\sigma_\mu^2 & \sigma_\mu^2+\sigma_\nu^2+\sigma_\rho^2 \end{bmatrix}^{-1}$ exists and equals

$$\begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & \frac{\sigma_\delta^2\left(\sigma_\mu^2+\sigma_\nu^2+\sigma_\rho^2\right)+\sigma_\mu^2\left(\sigma_\nu^2+\sigma_\rho^2\right)}{\Psi} & -\frac{\sigma_\mu^2\left(\sigma_\nu^2+\sigma_\rho^2\right)}{\Psi} & \frac{\sigma_\gamma^2\sigma_\mu^2}{\Psi} \\ 0 & -\frac{\sigma_\mu^2\left(\sigma_\nu^2+\sigma_\rho^2\right)}{\Psi} & \frac{\sigma_\delta^2\left(\sigma_\mu^2+\sigma_\nu^2+\sigma_\rho^2\right)+\sigma_\mu^2\left(\sigma_\nu^2+\sigma_\rho^2\right)}{\Psi} & \frac{\sigma_\delta^2\sigma_\mu^2}{\Psi} \\ 0 & \frac{\sigma_\gamma^2\sigma_\mu^2}{\Psi} & \frac{\sigma_\delta^2\sigma_\mu^2}{\Psi} & \frac{\sigma_\delta^2\left(\sigma_\mu^2+\sigma_\gamma^2\right)+\sigma_\gamma^2\sigma_\mu^2}{\Psi} \end{bmatrix},$$

where $\Psi = \sigma_\delta^2\left(\sigma_\gamma^2\left(\sigma_\mu^2+\sigma_\nu^2+\sigma_\rho^2\right)+\sigma_\mu^2\left(\sigma_\nu^2+\sigma_\rho^2\right)\right)+\sigma_\gamma^2\sigma_\mu^2\left(\sigma_\nu^2+\sigma_\rho^2\right)$, the solution is

$$\begin{bmatrix} a_0 \\ a_1 \\ a_2 \\ a_3 \end{bmatrix} = \frac{\sigma_\mu^2}{\Psi} \begin{bmatrix} 0 \\ -\sigma_\gamma^2\left(\sigma_\nu^2+\sigma_\rho^2\right) \\ -\sigma_\delta^2\left(\sigma_\nu^2+\sigma_\rho^2\right) \\ \sigma_\delta^2\sigma_\gamma^2 \end{bmatrix}. \tag{A5}$$

Thus, the projection of κ_t on $\Delta\pi_t$, ΔU_t, $(\Delta w_{i,t}-u_{i,t}\alpha_{g,t})$ and a constant is

$$P\left[\kappa_t \mid 1, \Delta\pi_t, \Delta U_t, (\Delta w_{i,t}-u_{i,t}\alpha_{g,t})\right] = \hat{\kappa}_t = \frac{\sigma_\mu^2}{\Psi}\begin{pmatrix} -\sigma_\gamma^2\left(\sigma_\nu^2+\sigma_\rho^2\right)\Delta\pi_t - \sigma_\delta^2\left(\sigma_\nu^2+\sigma_\rho^2\right)\Delta U_t \\ +\sigma_\delta^2\sigma_\gamma^2\left(\Delta w_{i,t}-u_{i,t}\alpha_{g,t}\right) \end{pmatrix}. \tag{A6}$$

In the case of estimating $\theta_{i,t}$, we have

$$\begin{bmatrix} E[\theta] \\ E[\theta\Delta\pi] \\ E[\theta\Delta U] \\ E[\theta(\Delta w\prime)] \end{bmatrix} = \begin{bmatrix} 1 & E[\Delta\pi] & E[\Delta U] & E[\Delta w\prime] \\ E[\Delta\pi] & E\left[\Delta\pi^2\right] & E[\Delta\pi\Delta U] & E[\Delta\pi(\Delta w\prime)] \\ E[\Delta U] & E[\Delta\pi\Delta U] & E\left[\Delta U^2\right] & E[\Delta U(\Delta w\prime)] \\ E[\Delta w\prime] & [\Delta\pi(\Delta w\prime)] & E[\Delta U(\Delta w\prime)] & E\left[(\Delta w\prime)^2\right] \end{bmatrix} \begin{bmatrix} b_0 \\ b_1 \\ b_2 \\ b_3 \end{bmatrix}. \tag{A7}$$

Using the relations in (2.3), (2.4), (2.5), (2.6) and (2.7), these equations can be written

$$\begin{bmatrix} 0 \\ 0 \\ 0 \\ \sigma_\nu^2 \end{bmatrix} = \begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & \sigma_\mu^2+\sigma_\delta^2 & \sigma_\mu^2 & -\sigma_\mu^2 \\ 0 & \sigma_\mu^2 & \sigma_\mu^2+\sigma_\gamma^2 & -\sigma_\mu^2 \\ 0 & -\sigma_\mu^2 & -\sigma_\mu^2 & \sigma_\mu^2+\sigma_\nu^2+\sigma_\rho^2 \end{bmatrix} \begin{bmatrix} b_0 \\ b_1 \\ b_2 \\ b_3 \end{bmatrix}, \tag{A8}$$

with the solution

$$\begin{bmatrix} b_0 \\ b_1 \\ b_2 \\ b_3 \end{bmatrix} = \frac{\sigma_\nu^2}{\Psi} \begin{bmatrix} 0 \\ \sigma_\gamma^2\sigma_\mu^2 \\ \sigma_\delta^2\sigma_\mu^2 \\ \sigma_\gamma^2\sigma_\mu^2+\sigma_\delta^2\left(\sigma_\mu^2+\sigma_\gamma^2\right) \end{bmatrix}. \tag{A9}$$

Thus, the projection of $\theta_{i,t}$ on $\Delta\pi_t$, ΔU_t, $(\Delta w_{i,t}-u_{i,t}\alpha_{g,t})$ and a constant is

$$P[\theta_t \mid 1,\Delta\pi_t,\Delta U_t,(\Delta w_{i,t}-u_{i,t}\alpha_{g,t})] = \hat{\theta}_{i,t} = \frac{\sigma_\nu^2}{\Psi}\begin{pmatrix} \sigma_\gamma^2\sigma_\mu^2\Delta\pi_t+\sigma_\delta^2\sigma_\mu^2\Delta U_t \\ +\left(\sigma_\gamma^2\sigma_\mu^2+\sigma_\delta^2\left(\sigma_\mu^2+\sigma_\gamma^2\right)\right)(\Delta w_{i,t}-u_{i,t}\alpha_{g,t}) \end{pmatrix}. \tag{A10}$$

Appendix B Description of the Variables

Vote

This binary micro variable is coded differently in the cross-sectional and in the panel specifications. The variable is based on answers to the following question in the Swedish election studies: "We had several elections at the same time this year. Which party did You vote for in the general election?" To simplify matters, votes for parties that did not win seats in parliament are coded as missing values. In the cross-sectional specifications, the variable is coded 1 if the individual voted for any of the parties in the governing coalition and coded 0 for the parties in the opposition, as described by the following table:

	s	v	mp	m	fp	c	kd	nyd
1985	1	1	-	0	0	0	-	-
1988	1	1	1	0	0	0	-	-
1991	1	1	-	0	0	0	0	0
1994	0	0	0	1	1	1	1	-

In the specifications with panel data, the variable is coded 1 for left-wing parties and 0 for right-wing parties, as described by the following table:

	s	v	mp	m	fp	c	kd	nyd
1985	1	1	-	0	0	0	-	-
1988	1	1	1	0	0	0	-	-
1991	1	1	-	0	0	0	0	0
1994	1	1	1	0	0	0	0	-

s: Socialdemokratiska arbetarpartiet (Social Democratic Party)

v: Vänsterpartiet (Left Party)

mp: Miljöpartiet de gröna (Green Party)

m: Moderata Samlingspartiet (Conservative Party)

c: Centerpartiet (Centrist Party)

kd: Kristdemokraterna (Christian Democratic Party)

nyd: Ny Demokrati (New Democratic Party)

ΔU

The difference between average unemployment in the present and in the last term of office. Based on the official figures of the The National Labor Market Board (AMS).

Δπ

The difference between the annual inflation during the present and the last term of office.

ΔGDP

The difference between the annual rate of real GDP growth during the present and the last term of office.

	U	ΔU	π	$\Delta\pi$	ΔGDP
1983-85	3.2	.3	8.0	-3.4	2.3
1986-88	2.7	-.6	4.7	-3.4	1.7
1989-91	1.9	1.6	8.7	4.1	.5
1992-94	6.8	4.7	3.0	-5.7	-.5
Mean	3.7	1.5	6.1	-2.1	1.0
St. Dev.	1.5	2.3	2.7	4.3	1.2

P(Macro)

Perception of the change in the country's economy. The variable is based on answers to the following question: "According to your own opinion, how has the Swedish economy developed the last two or three years. Has it gotten better, stayed

about the same or gotten worse?" Better is coded 1, about the same is coded 0 and worse is coded -1.

Δw

The relative change in personal income net of taxes between the year before the election of study and the year before the last election. If the income in either year equals zero, the value is assumed to be missing.

P(Micro)

Perception of the change in the own financial situation. The variable is based on answers to the following question: "If you compare your financial situation with how it was two or three years ago, has it gotten better, stayed about the same or has it gotten worse?" It is coded as P(Macro).

u

Dummy variable coded one if the respondent had been unemployed since the last election. The shares of unemployed individuals in the sample are as follows:

1985	1.5%
1988	1.0%
1991	2.2%
1994	8.1%
1985-94	3.0%

Left

Dummy variable indicating a left-wing government. It is coded one in 1985, 1988 and 1991.

Right

Dummy variable indicating a right-wing government. It is coded one in 1994.

Attitude

The structurally determined probability to support the incumbent government. Computed as the predicted probability to vote for any of the parties in the governing coalition based on the following variables: education, church attendance, sector of employment (private or public), home ownership, occupation, and the home town's population. The following table displays the estimates used for the computations:

Variable	Coefficient	St. Error
Edu1	-.300**	.050
Edu2	-.364**	.061
Church	-.846**	.077
Public	.287**	.045
Home	-.185**	.045
Country	-.032*	.018
Laborer	.508**	.051
EHO	-.508**	.057
Constant	.239**	.060
Log likelihood	-2,391	
Correct Predictions	68.0%	
# Observations	3,926	

Probit model. The dependent variable vote is coded 1 for the left-wing parties (s, v and mp) and 0 for the right-wing parties (m, fp, c, kd, nyd). * indicates significance at the 10% level. ** indicates significance at the 1% level. The following explanatory variables are all dummy variables:

Edu1	High school (gymnasium) graduate without higher education.
Edu2	At least some college.
Church	Goes to church at least once a month.
Public	Employed in the public sector.
Home	Owns the own home.
Country	Lives in the country or in a small town.
Laborer	Laborer by profession.
EHO	Entrepreneur or higher official by profession.

Descriptive Statistics

Variable	Mean	St. Dev.	Min	Max	Cases
$P(Macro)$	-.30	.85	-1.00	1.00	4,199
Δw	.66	4.38	-.99	112.30	5,937
$P(Micro)$	.03	.76	-1.00	1.00	4,404
u	.03	.16	0	1.00	4,703
Attitude	.51	.20	.04	.95	5425

Appendix C Sensitivity Analysis

		Unbalanced panel		Balanced panel			
		1	2	3	4	5	6
Macroeconomic	ΔU_t	-.161**		-.220**		-.296**	
variables		(.013)		(.014)		(.075)	
	$\Delta \pi_t$	-.053**		-.073**		.002	
		(.007)		(.010)		(.022)	
	$P(Macro)$		.477**		.625**		.540**
			(.031)		(.038)		(.037)
Microeconomic	$P(Micro)$	.159**	.092*	.181**	.116**	.206**	.109**
variables		(.037)	(.036)	(.045)	(.042)	(.042)	(.041)
	$u_{i,t}$	.374	.294	.265	.227	.900**	.874**
		(.192)	(.185)	(.198)	(.185)	(.327)	(.326)
	$Constant$	-.109**	-.096**	-.222**	-.252**	.128*	.069
		(.035)	(.033)	(.050)	(.041)	(.061)	(.036)
	Elections	1985—94	1985—94	1988—94	1988—94	1985—91	1985—91
	Log likelihood	-2,386	-2,364	-2,583	-2,273	-2,583	-2,494
	Correct predictions	59.6%	61.9%	60.8%	63.4%	60.4%	63.5%
	# Observations	3,706	3,706	3,731	3,731	3,982	3,982
	ρ	.493	.453	.670	.616	.635	.601

Notes: see Table 5.

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